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## Integration Test with 2S Module Prototypes on a CO<sub>2</sub> Cooled Ladder

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To deal with the increased luminosity of the HL-LHC, the CMS experiment will be upgraded until 2028. During this Phase-2 Upgrade the CMS Outer Tracker will be equipped with modules each consisting of two silicon sensors, either two strip sensors (2S module) or one pixelated and one strip sensor (PS module), depending on the position in the tracker. In the barrel region of the CMS Outer Tracker, the 2S modules are placed on mechanical support structures called ladders. A fully equipped ladder contains twelve modules which are screwed down to so-called inserts. The inserts are connected to a cooling pipe which allows CO<sub>2</sub> cooling of the inserts and thus the modules.

During the prototyping phase integration tests with modules on the support structures are performed. This talk presents the results of the first integration test with three 2S modules mounted on a CO<sub>2</sub> cooled ladder. One of the modules was irradiated with a fluence slightly above the expectation for the end of the CMS run-time. This module is equipped with temperature sensors to measure the thermal performance of the module on the final ladder structure. The results of the thermal measurements are compared with the expectation derived from the thermal simulation of the modules on the ladder.

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